STS-114 Return Samples: Assessment of Air Quality Aboard the Shuttle (STS-114) and International Space Station (LF-1)

The toxicological assessments of 3 grab sample canisters (GSCs), and 1 pair of formaldehyde badges from the Shuttle are reported in Table 1. Analytical methods have not changed from earlier reports. The recoveries of the 3 surrogates (^{13}C-acetone, fluorobenzene, and chlorobenzene) from the 3 GSCs averaged 102, 87, and 89 %, respectively, and from 3 formaldehyde control badges the average recovery was 99 %.

Table 1. Analytical Summary of Shuttle Samples

Sample Location	Date of Sample	NMVOCs [1] (mg/m^3)	T Value[2] (units)	Alcohols (mg/m^3)	Formaldehyde (ug/m^3)
Preflight Middeck	7/26/05	0.9	0.02	0.25	--
Flight Deck	8/5-8/8/05	--	--	--	38
Middeck	8/8/05	8.2	0.21	1.6	--
Middeck	8/9/05	3.4	0.11	0.6	--

[1] Non-methane volatile organic hydrocarbons.
[2] Calculated excluding CO_2 and formaldehyde.

The toxicological assessment of 4 GSCs, 6 dual sorbent tubes (DSTs), and 12 formaldehyde badges from the ISS is shown in Table 2. The recoveries of the 3 standards from the GSCs averaged 91, 105 and 100%; however, recoveries of the same 3 standards from the 6 DSTs averaged 47, 104, and 101%. The recovery of formaldehyde from a single laboratory control (other controls were not returned) was 60%.

Table 2. Analytical Summary of ISS Results

Module/Sample	Approx. Date	NMVOCs (mg/m^3)	T Value (units)	Alcohols (mg/m^3)	Formaldehyde (ug/m^3)[1]
SM/GSC/Formal.	12/10/04	8.8	0.68	5.5	27
SM/GSC	3/17/05	9.5	1.08[2]	6.4	--
SM/GSC	5/05/05	9.0	0.66	6.0	--
Lab/DST/Formal.	5/17/05	8	0.7	6	35
SM/DST/Formal.	5/17/05	8	0.7	6	30
Lab/DST/Formal.	6/15/05	9	0.6	7	40
SM/DST/Formal.	6/15/05	15	1.4	11	27
Lab/DST/Formal.	7/12/05	7	0.6	6	43
SM/DST/Formal.	7/12/05	6	0.6	5	32
MPLM/GSC[3]	7/29/05	18	1.23	6.2	--
Guideline		*<25*	*<1.0*	*<5*	*<120*

[1] A new long-term SMAC has been provisionally accepted by the National Research Council Committee on Toxicology and by the NASA Toxicology Group.
[2] High value due to traces of acrolein and benzene that were not seen in other samples
[3] Sample taken at first entry. Crew exposures were very brief to this atmosphere.

Enclosures

Table 1: Analytical concentrations of compounds found in the STS-114 GSCs
Table 1A: Analytical concentrations of compounds found in the LF-1 DSTs
Table 1B: Analytical concentrations of compounds found in LF-1 GSCs
Table 2: T-values of the compounds in table 1.
Table 2A: T-values of the compounds in table 1A.
Table 2B: T-values of the compounds in table 1B